UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/586,953	07/25/2006	Makoto Iida	128832	3409

25944 7590 09/17/2010

OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

EXAMINER	
RAO, G NAGESH	

ART UNIT	PAPER NUMBER
1714	

NOTIFICATION DATE	DELIVERY MODE
09/17/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

OfficeAction25944@oliff.com
jarmstrong@oliff.com

Office Action Summary	Application No.	Applicant(s)	
	10/586,953	IIDA ET AL.	
	Examiner	Art Unit	
	G. NAGESH RAO	1714	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *49-52,55-74,77 and 78* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *49-52,55-74,77 and 78* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/27/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1 .1 14

1) A request for continued examination under 37 CFR 1 .1 14, including the fee set forth in 37 CFR 1 .17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1 .1 14, and the fee set forth in 37 CFR 1 .17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/15/10 has been entered.

Method Claims Embodied with Apparatus Claims

2) Upon review of the claimed invention, it is the examiner's position that the claims are directed towards a method and therefore will be treated in accordance to examination of "method claims". Furthermore the material worked upon or used in the system is viewed as a recitation of intended use on part of the actual device components and therefore will not be afforded any patentable limitation weight towards the structure of the device. For further details examiner points to MPEP 2114 [R-1].

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3) Claims 49-52 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakurada (US Pg Pub 2003/0116082).

Sakurada 082 pertains to a method of fabricating a Silicon single crystal via an apparatus (see Abstract and Figure 2). Furthermore as denoted by Figure 1, a defect region therein contains a Nv region outside an OSF ring over the entire region in the direction of the crystal growth axis. As well Sakurada 082 does disclose a temperature of 1000^0C or higher (1400^0C) for processing the single crystal growth material in the quartz crucible which does not have indicated of having any Cu concentration, therefore falling within the claimed range of the component made of quartz having 1 ppb or less (i.e. including Zero) and/or 10 ppb or less (i.e. including Zero) (see Sections 59, 63, and 97-101).

4) Claims 49-50 and 55-64 are rejected under 35 U.S.C. 102(b) as being anticipated by Oda (US Pg Pub 2003/0000457).

Oda 457 discloses among many things a clean room at a class 1000 setting that allows for the growth, processing, and manufacturing of Silicon single crystal material made via a Cz growth technique in a quartz crucible, there being multiple puller apparatuses from several to several tens (See Abstract, Section 0003, Section 0005, Sections 0040-0042). Furthermore Oda 457 makes no mention of the use of a Cu raw material being used in conjunction with the cleaning tools, jigs, etc used in the clean room which anticipates the claims denoted by applicant, as it is maintained in a class 1000 clean room environment (See Sections 0001-0043).

Examiner points out that quartz crucible which does not have indicated of having any Cu concentration, therefore falls within the claimed range of the component made of quartz having 1 ppb or less (i.e. including Zero) and/or 10 ppb or less (i.e. including Zero). It furthermore intuitive based on the drawings and layout to have the transfer of components to another room in which the cleanliness of the room environment is class 1000 or more based on the cited prior art disclosure of Oda 457 (based on the cited disclosure of a plurality of operation floors (Sections 0025-0027 and section 0038).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35

U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5) Claim 74 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Oda (US Pg Pub 2003/0000457).

Oda 457 discloses among many things a clean room at a class 1000 setting that allows for the growth, processing, and manufacturing of Silicon single crystal material made via a Cz growth technique in a quartz crucible, there being multiple puller apparatuses from several to several tens (See Abstract, Section 0003, Section 0005, Sections 0040-0042). Furthermore Oda 457 makes no mention of the use of a Cu raw material being used in conjunction with the cleaning tools, jigs, etc used in the clean room which anticipates the claims denoted by applicant, as it is maintained in a class 1000 clean room environment (See Sections 0001-0043). Examiner points out that quartz crucible which does not have indicated of having any Cu concentration, therefore falls within the claimed range of the component made of quartz having 1 ppb or less (i.e. including Zero) and/or 10 ppb or less (i.e. including Zero). It furthermore intuitive based on the drawings and layout to have the transfer of components to another room in which the cleanliness of the room

environment is class 1000 or more based on the cited prior art disclosure of Oda 457 (based on the cited disclosure of a plurality of operation floors (Sections 0025-0027 and 0038).

For sake of argument, examiner is willing to denote this limitation may be not explicitly clear, but rather intuitive if not at least obvious with respect to the step of transferring components based on typical operation procedures utilized in standard microelctronic cleanroom fabrication labs (thus it's applicability on the one hand as a 102 rejection and/or 103 rejection). It would be obvious to one having ordinary skill in the art at the time of the present invention to transfer materials in the process of being utilized (like Si crystal ingots) to clean room fab labs at a class of 1000 or higher in order to ensure minimization of air contaminants from effecting the quality of materials utilized in these sensitive chemical and materials science processes.

6) Claims 65-73 and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oda (US Pg Pub 2003/0000457) in view of Holder (US Patent No. 6,344,083).

As previously disclosed in the aforementioned rejection Oda 457 discloses a method of fabricating a Si single crystal material in a clean room class setting of 1000.

However Oda 457 fails to explicitly disclose the specified method as described by applicants for fabrication of the Si single crystal melt specifically time and energy power parameters.

In the same field of endeavor, Holder 083 clearly discloses a method for producing a silicon single crystal by Cz method which includes a melting and equilibrium phase of the raw material for 3.5 hrs and utilization of heaters at appropriate temperature settings as well flowing of insoluble (reads on inert) gases into the crystalline mix. Furthermore the quartz crucible material is not disclosed as having any Cu concentration and thus considered to void/free of said limitation (See Cols 1-6 Lines 1-69).

It would be obvious to one having ordinary skill in the art at the time of the present invention to modify the teachings of Oda 457 with that of Holder 083 to ensure an appropriate and defect free fabrication of Si single crystalline ingots for appropriate and efficient use in the microelectronic industry.

Furthermore the issue of the electric power setting, that is an resultant effective variable that is readily determined by operator's usage. It would be

obvious to one having ordinary skill in the art at the time of the present invention to modify power settings based on desired results for achieving optimal conditions. Routine experimentation would be readily feasible to one having ordinary skill in the art at the time of the present invention.

7) Claim 77 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oda (US Pg Pub 2003/0000457) in view of Tsuji (US Patent No. 6,068,699).

From the aforementioned Oda 457 rejection the disclosure of a Cz growth single crystal silicon material is disclosed with multiple apparatuses.

However Oda 457 is not explicit with respect to the incorporation of a quartz window to observe the growth of the crystalline material.

Tsuji 699 discloses an apparatus for single crystal silicon grown according to the Cz method, whereby a quartz window is utilized outside the furnace to observe the growth of single crystalline material. Examiner points out that quartz window nor quartz crucible which does not have indicated of having any Cu concentration, therefore falls within the claimed range of the component made of quartz having 1 ppb or less (i.e. including Zero) and/or 10 ppb or less (i.e. including Zero). Broadly the quartz window is a component utilized in the facilitating growth of the silicon single crystal material (See Fig 4 Col 1 Lines 1-68).

It would be obvious to one having ordinary skill in the art at the time of the present invention to incorporate the teachings of Tsuji 699 with that of Oda 457 in order to facilitate the ability to continually watch and improve growth parameters for the silicon crystal growth melt in order to ensure optimal and efficient growth techniques are utilized.

Response to Arguments

8) Applicant's arguments filed 6/24/10 have been fully considered but they are not persuasive.

Upon review of the remarks and claim amendments, examiner has agreed to withdraw applicable claim objections and corresponding 112 and 101 rejections.

However with respect to the claim rejections under Sakurada 082, Oda 457, and Holder 083, examiner must respectfully disagree.

The crux of the arguments pertaining to the applicability of the Sakurada 082 and Oda 457 references is the limitation regarding the "Cu concentration". The limitation essentially and broadly reads as one of the components utilized in the manufacturing method of the single crystal silicon material, contains a Cu concentration value ranging at 1ppb or **less** and 10 ppb or **less**. The range therefore

includes a value of zero, meaning that there exists a quartz based components with no Cu concentration value necessary in the claimed limitation. That being the case, the art cited is silent on Cu concentration, which is fine since that components made of quartz would still read on the claimed invention, since a Cu concentration as claimed was not necessary to have in the component. Applicants have not provided any evidence that would suggest that the prior art teaches either Cu concentration beyond the 1 or 10 ppb ranges or that the silence of Cu concentration does not necessarily mean a lack of Cu concentration. Yet, if the teaching makes no mention in the prior art it would be presumed that the limitation is not taught in the reference, and since the Cu concentration limitation can be of some value or none, which means optional and/or lacking the limitation.

With respect to the 103 rejection the remarks pertain to issues disclosed in the specification and prior art but not actually claimed by applicant. As well issues regarding the "Cu concentration" values of 1 ppb or less and 10 ppb or less, which examiner has already addressed. Examiner has already addressed the power parameter issues as being resultant effective variables that Holder 083 remedies in an obvious fashion based on routine experimentation.

Therefore at this time, examiner must respectfully disagree that the patent application is in condition for allowance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. NAGESH RAO whose telephone number is (571)272-2946. The examiner can normally be reached on 8:30AM-5PM (INDEPENDENT FLEX SCHEDULE).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael KORNAKOV can be reached on (571)272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. Nagesh Rao/
Patent Examiner
Art Unit 1714